

IN THE CLAIMS:

1. *(currently amended)* A WDM optical communication system including an arrangement for assessing the polarization of each optical signal within a plurality of wavelength division multiplexed signals propagating along a transmission optical fiber path, the arrangement comprising

at least one in-line fiber polarimeter disposed along and integral with said transmission optical fiber path, said at least one in-line fiber polarimeter configured to out-couple predetermined portions of each optical signal passing therethrough to collect information with respect to the state of polarization for each optical signal; and

a network control element, responsive to the output from said at least one in-line fiber polarimeter, for either one of modifying and controlling the polarization of one or more of said optical signals in response to the state of polarization information.

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2. *(currently amended)* The WDM optical communication system as defined in claim 1 wherein the at least one in-line fiber polarimeter comprises a plurality of in-line fiber polarimeters.

3. *(currently amended)* The WDM optical communication system as defined in claim 1 wherein the at least one in-line fiber polarimeter comprises a single in-line fiber polarimeter.

4. *(currently amended)* The WDM optical communication system as defined in claim 1 wherein at least one in-line fiber polarimeter comprises a partial polarimeter.

5. *(currently amended)* The WDM optical communication system as defined in claim 1 wherein at least one in-line fiber polarimeter comprises a complete polarimeter.

6. - 7. *cancelled*

**8. (currently amended)** An active polarization control arrangement for use in an optical transmission system, the active polarization control arrangement comprising

a polarization control element responsive to an input optical signal propagating along an optical fiber transmission path, the polarization control element for producing as an output an optical signal exhibiting a predetermined state of polarization;

an in-line fiber polarimeter formed as an integral with part of the optical fiber transmission path and configured to out-couple signals determined by the state of polarization of the input optical signal; and

a feedback control element disposed between the in-line fiber polarimeter control signal output and an adjustable input to the polarization control element, said feedback control element for providing correction signal inputs to the polarization control element based on the control signal outputs from the in-line polarimeter.

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**9. (currently amended)** An active polarization control arrangement as defined in claim 8 wherein the in-line fiber polarimeter is defined as a complete in-line fiber polarimeter and comprises a set of four fiber gratings incorporated in the optical fiber transmission path, each set tilted at one of the predetermined angles of 0°, 60°, 150°, and 90°, with a waveplate oriented at an angle of 30° with respect to the optical axis disposed between the second and third fiber gratings.

**10. (currently amended)** An active polarization control arrangement as defined in claim 8 wherein the in-line fiber polarimeter is defined as a complete in-line fiber polarimeter and includes a set of four dielectric filters, each filter tilted at one of the predetermined angles of 0°, 60°, 150°, and 90°, with a waveplate oriented at an angle of 30° with respect to the optical axis disposed between the second and third filter.

**11. (currently amended)** An optical transmission system comprising a transmitter for providing one or more optical input signals, an optical fiber transmission path and an optical receiver, said optical transmission system further comprising

at least one active polarization control arrangement, each active polarization control arrangement including

a polarization control element responsive to one or more input optical signals propagating along the optical fiber transmission path, the polarization control element for producing as an output an optical signal exhibiting a predetermined state of polarization;

an in-line fiber polarimeter integral with ~~the~~ said optical fiber transmission path and configured to out-couple signals determined by the state of polarization of the input optical signal; and

a feedback control element disposed in a signal path between the in-line fiber polarimeter control signal output and an adjustable input to the polarization control element, said feedback control element for providing correction signal inputs to the polarization control element based on the control signal outputs from the in-line fiber polarimeter.

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12. *(currently amended)* An optical transmission system as defined in claim 11 wherein the optical fiber transmission path comprises at least a section of birefringent fiber and the active polarization control arrangement is used to orient the polarization axes of the optical output from the in-line fiber polarimeter with the optical axes of the birefringent transmission path optical fiber.

13. *(currently amended)* An optical transmission system as defined in claim 11 wherein the transmission system further comprises a polarization beam splitter, disposed at the output of the in-line fiber polarimeter, the polarization control element utilized to adjust the output signal state of polarization to align with one of the beamsplitter principal axes.

14. *(currently amended)* ~~An active polarization control arrangement~~ optical transmission system as defined in claim 11 ~~13~~ wherein the ~~arrangement~~ transmission system further comprises wavelength filters disposed at each output of the polarization beam splitter to discriminate between two orthogonal channels with closely spaced wavelengths.

15. *(currently amended)* The optical ~~communication~~ transmission system as defined in claim 11 wherein the in-line fiber polarimeter of the active polarization control arrangement is a complete polarimeter and comprises a set of four fiber gratings incorporated in optical fiber, each set tilted at one of the predetermined angles of 0°, 60°, 150°, and 90°, with a waveplate oriented at an angle of 30° with respect to the optical axis disposed between the second and third gratings.

16. *(currently amended)* The optical ~~communication~~ transmission system as defined in claim 11 wherein the in-line fiber polarimeter of the active polarization control arrangement comprises a complete polarimeter and includes a set of four dielectric filters, each filter tilted at one of the predetermined angles of 0°, 60°, 150°, and 90°, with a waveplate oriented at an angle of 30° with respect to the optical axis disposed between the second and third filters.

17. *(currently amended)* The optical ~~communication~~ transmission system as defined in claim 14 wherein the at least one active polarization control arrangement comprises a first arrangement disposed at an optical transmitter and a second arrangement disposed at an optical receiver.

18. *(currently amended)* The optical ~~communication~~ transmission system as defined in claim 11 wherein the at least one active polarization control arrangement comprises an in-line fiber polarimeter located at the optical receiver and the polarization controller located at the optical transmitter, using a telemetry channel to transmit feedback information from the in-line fiber polarimeter to the polarization controller.

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